PHYS 253 TLC – Fundamentals of Physics I: Mechanics
Section T301, Fall 2020

Instructor: Dr. Michael Eads
Office: LaTourette 209
Office hours: By appointment
Phone: (815) 753-6492
Email: meads@niu.edu

Teaching Assistant: William Baker Z1806348@students.niu.edu
Mark Mekosh Z1876510@students.niu.edu

Text: Katz, *Physics for Scientists and Engineers: Foundations and Connections*, 1st Ed. (Cengage), https://www.cengage.com/c/physics-for-scientists-and-engineers-foundations-and-connections-extended-version-with-modern-1e-katz/

This is available as either a complete textbook, or split into two volumes. It is also available in bound or loose-leaf versions. Any version will work (only volume 1 is needed for PHYS 253). The same textbook is used for PHYS 273 (Fundamentals of Physics II) and PHYS 283 (Fundamentals of Physics III). If you purchase a printed copy of the textbook, make sure to get the "First Edition" (and not the "Advance Edition"). The online homework website includes an eBook version of the textbook, so a printed copy is not required. We will be using on online homework system called WebAssign (available at http://www.webassign.net). You can log onto WebAssign through the Blackboard course website. You need to purchase access to the website (you have a two week grace period). The bookstore may have WebAssign access cards for sale. You can also purchase access directly from the website.

You can also purchase a "Cengage Unlimited" option. This option gives you access to WebAssign (including the eBook version of the textbook) for any and all of your courses that use it. There are options to purchase access for one semester and two semesters. (Note: Your MATH 229 course may also be using WebAssign.) If you will be taking PHYS 273 (Fundamentals of Physics II) next semester (which all of you should), the two semester option is the most cost effective.

Course description: PHYS 253 is the first semester of calculus-based general physics covering physical laws governing motion, force, energy, rotation, and vibration. There is one three-hour laboratory a week.

The MATH 229/PHYS 253 themed learning community is a unique opportunity for engineering students. Students are simultaneously enrolled in in both Calculus I and General Physics. The course schedules have been adjusted to ensure that students have covered the needed topics in calculus.

Course objectives:

- Students will be able to describe, critically analyze, and solve problems based on a variety of physical systems using the physics concepts of
    - Kinematics (in up to three dimensions)
    - Newtonian mechanics (forces, Newton's laws, friction, circular motion, and gravitational forces and fields)
    - Material properties and Statics (stress and strain, deformation of elastic materials, and the analysis of static rigid objects and systems)
    - Energy and Work (kinetic and potential energy, work from constant and changing forces, and conservation of energy in conservative and non-conservative systems)
    - Momentum and Impulse (linear momentum, conservation of linear momentum, and its application to collisions)
    - Angular Kinematics and Dynamics (angular velocity and acceleration, torque, work and energy in rotating systems, and angular momentum)
    - Fluids (both static and simple dynamics)
- Students will be able describe and analyze real-life physical systems using the above physics concepts.
- Students will collect, analyze, and interpret real data, as well as draw scientific conclusions based on that data.
- Students will construct mathematical models of real-life physical systems.
- Students will pose scientific questions, develop experiments to test these questions, and test models and hypotheses.
- Students will develop technical and practical laboratory skills, including making measurements with standard equipment, recording measurements and observations, assessing measurement uncertainties, and propagating uncertainties to calculated quantities.
- Students will analyze and visualize data, using appropriate statistical methods, critically interpreting the validity and limitations of that data, and using appropriate plotting techniques to visually display that data.
- Students will present results and ideas to others through both written reports and oral presentations.

The major assessments for the first two objectives are the weekly homework assignments, tests, final exam, and create-your-own-problem assignments. The major assessments for the remaining objectives are the lab reports, lab assignments, and lab presentations.

Expectations:

Needless to say, things will be a bit different this semester. The course will (for obvious reasons) be mostly delivered online. The exceptions to this are three tests during the semester and the final, which will all be in person, on campus. The three tests during the semester are all on Fridays (Oct 2, Oct 30, and Nov 20) at the normal class time (9-9:50am). These will be held in LaTourette Hall room 200. This is a large lecture hall and we'll have plenty of room to social distance. The final exam

will be on Wednesday, December 9 from 8 to 9:50am. The room has not yet been assigned. If you will be unable to attend these in-person sessions for the tests, please let me know as soon as possible.

For the "lecture" part of the course, a lot of the material will be available asynchronously as videos (some of which include embedded quizzes). However, we will also be making use of our scheduled "synchronous" time (MWF from 9-9:50am) to meet (over video) with Blackboard Collaborate. My current plan is Mondays will be used for answering your questions, clearing up confusion, and highlighting some of the important points for the coming week. Wednesdays will mostly involve you working on some problems and conceptual questions in groups with your fellow students. Fridays will be answering your questions, clearing up any remaining confusion, and offering some hints on the upcoming homework. Every day will be valuable and I strongly encourage you to attend all the synchronous sessions. Attending the class sessions is a way to keep you focused and on track throughout the semester. It is also well established that people learn better through interacting with others than they do on their own.

You are also all enrolled in a lab section (Section T302 Weds 3-5:50pm or Section F Thurs 6-8:50pm). These lab sessions will also be online. The labs will involve a combination of simulations, video, and data collection (with smart phones or other devices). You will be working in groups for the labs. More information will be provided by your lab TA.

Course information will be disseminated through the Blackboard site (http://webcourses.niu.edu).

There is a virtual help room, staffed by physics graduate students. This is a useful resource if you have questions about homework problems, labs, particular topics, etc… Someone should be available in the virtual help room Monday through Friday from 9am to 4pm. The url to connect is http://go.niu.edu/q1eptu

While I have been teaching physics for quite a while, this will be the first time I am teaching this course almost completely online. I have given the format some thought, and I believe you will still be able to learn just as much physics as if we were meeting in person. (This will, of course, require some effort and discipline on your part. But then, it would also have required some effort and discipline on your part if we were in person. ☺) I understand that some flexibility may be required. Please contact me if you are ever having any difficultly during the semester. I also value your feedback, and will likely do one or two (anonymous) surveys over the course of the semester to make sure that course format is working for you. Good communication is going to be essential. We are all in this together, and it is only by working together that we will succeed. *Forward, together forward*

Assignments and Grading:

Your grade will be determined from a combination of in-class activities, homework, labs, quizzes, tests, and the final. There will be approximately one homework assignment, one in-class assignment, and several pre-lecture assignments per week. These assignments and the due dates will be announced in class and will be posted on Blackboard. Each lab will have an associated assignment

that is due at the beginning of the next week's lab session. There will be three in-class exams during the semester. Finally, there is a comprehensive final exam.

Your final grade for the course will be made up of 25% for the lab portion and 75% for the lecture portion. The lecture portion of your grade will be composed of 30% from quizzes, homework, and in-class activities, 15% for each of the three tests, and 25% for the final.

IMPORTANT NOTE: YOU MUST PASS THE LABS TO PASS THE COURSE. THAT IS, YOUR CUMULATIVE SCORE ON THE LABS MUST EXCEED 60% OR YOU WILL RECEIVE A FAILING GRADE FOR THE COURSE.

The tentative grading scale will be:

A: 93% and higher
A-: 90-92%
B+: 87-89%
B: 83-86%
B-: 80-82%
C+: 77-79%
C: 70-76%
D: 60-69%
F: below 60%

It is the students' responsibility to request an extension for assignments that are not completed on time. Except in extreme circumstances, an extension must be requested prior to the assignment deadline.

Themed Learning Community (TLC) Policy

This course is part of a Themed Learning Community, meaning it is intentionally paired with one or two other courses taken in conjunction with one another. It is required that you are enrolled in **ALL TLC** courses simultaneously in order to benefit from the unique learning opportunity created by these bundled courses. If, for some reason, you wish to drop one of your TLC courses, you must drop all of the courses that make up this TLC. Students are responsible for seeking additional guidance from their TLC instructors or the Office of Student Engagement and Experiential Learning (OSEEL) regarding possible withdrawal from TLC courses.

Course Schedule

This schedule is tentative and subject to change.

Week	Topic	Chapters	Lab	
Week 1 Aug 24	Measurement, units, motion	1, 2	Intro and pre-assessment	
Week 2 Aug 31	1D motion	2	Skyscraper	*Labor Day*
Week 3 Sep 7	Vectors, 2D motion	3, 4	How to write a lab report	
Week 4 Sep 14	Projectile motion, relative motion	4	Coin Toss	
Week 5 Sep 21	Forces, Newton's Laws	5	Incline	
Week 6 Sep 28	Friction, Equilibrium	6	Projectile	Test 1 Friday, Oct 2 LaTourette 200
Week 7 Oct 5	Gravity, angular kinematics, torque	7, 12	Pulley	
Week 8 Oct 12	Statics, elasticity	14	Axle	
Week 9 Oct 19	Energy, conservation of energy	8	Ballistics	
Week 10 Oct 26	Work, non-conservative forces	9	Collisions	Test 2 Friday, Oct 30 LaTourette 200
Week 11 Nov 2	Momentum, center of mass	10	Pendulum	
Week 12 Nov 9	Collisions	11	Wheel, Part 1	
Week 13 Nov 16	Angular motion, rotational dynamics	12, 13	Wheel, Part 2	Test 3 Friday, Nov 20 LaTourette 200
Week 14 Nov 23	Angular momentum	13	*No lab*	*Thanksgiving*
Week 15 Nov 30	Pressure, fluids	15	Post-assessment	
Finals Dec 7	Final exam			Wed, Dec 9, 8-9:50am **Location TBD**

From "Protecting the Pack" document: Your health and safety are my No. 1 priority. We are all members of the Huskie community, and we owe it to each other to protect ourselves and each other. When I come to class, I'll be wearing a face covering. I expect you to do the same. If there is some reason that isn't possible for you, please contact me by email, and we'll see what arrangements can be made. If you come to class in person, you'll need to be
wearing a face mask.

I also expect you to monitor your health, and you should stay home if you've been exposed to someone who recently tested positive for COVID-19 or if you develop any symptoms that might be related to COVID-19. You are encouraged to us the #CampusClear app to document symptoms. If you do have symptoms, stay home and contact NIU's COVID helpline (815-753-0444) to report your symptoms and get advice.

All students must comply with the guidelines in NIU's "Protecting the Pack" document. The university will follow all applicable local, state, and federal public health guidelines and orders.

To help keep our community healthy, students and instructors will be required to wear protective face masks in class, including when they are speaking. Students are expected to supply and maintain their own face masks.

Students who cannot wear face masks or other personal protective equipment because of a disability should proactively contact, or be referred to, the Disability Resource Center (DRC) prior to the start of the fall semester. The DRC will engage in an interactive process to determine any reasonable accommodations. Faculty may review the approved accommodation documentation that students receive from the DRC.

Students are required to follow all reasonable directives from a faculty member while in class. A student who fails to comply with a request to wear a face mask in class will be considered to have disrupted the educational environment. If a student chooses not to comply with the request, the student will be asked to leave and, ultimately, the instructor has the authority to cancel class. Purposeful non-compliance by a student can result in loss of the privilege of attending class or receiving credit in the class. Uncooperative students will be subject to the "Classroom Disruption" process articulated in the catalog's Academic Regulations.

Please be advised that the instructor reserves the right to change aspects of this syllabus as pandemic circumstances change. This includes, but is not limited to, in-person classes going fully online, if necessary.

Accessibility: If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located in the Campus Life Building, Suite 180, and can be reached at 815-753-1303 or drc@niu.edu.

Also, please contact me privately as soon as possible so we can discuss your accommodations. Please note that you will not be required to disclose your disability, only your accommodations. The sooner you let us know your needs, the sooner we can assist you in achieving your learning goals in this course.

Academic Integrity: As detailed in the current NIU undergraduate catalog: *Good academic work must be based on honesty. The attempt of any student to present as his or her own work that which he or she has not produced is regarded by the faculty and administration as a serious offense. Students are considered to have cheated if they copy the work of another during an examination or turn in a paper or an assignment written, in whole or in part, by someone else. Students are responsible for plagiarism, intentional or not, if they copy material from books, magazines, or other sources without identifying and acknowledging those sources or if they paraphrase ideas from such sources without acknowledging them. Students responsible for, or assisting others in, either cheating or plagiarism on an assignment, quiz, or examination may receive a grade of F for the course involved and may be suspended or dismissed from the university.*

A faculty member has original jurisdiction over any instances of academic misconduct that occur in a course which the faculty member is teaching. The student shall be given the opportunity to resolve the matter in meetings with the faculty member and the department chair. If the facts of the incident are not disputed by the student, the faculty member may elect to resolve the matter at that level by levying a sanction no greater than an F for that course. The faculty member shall notify the student in writing whenever such action is taken, and the ***Office of Community Standards and Student Conduct*** *shall receive a copy of the* Academic Misconduct Incident Report *indicating final disposition of the case, which will be placed in the student's judicial file. In all matters where the charge of academic misconduct is disputed by the student or if the faculty member feels a sanction greater than an F in the course is appropriate (such as repeated offenses or flagrant violations), the faculty member shall refer the matter to the Office of Community Standards and Student Conduct making use of the* Academic Misconduct Incident Report. *Additional sanctions greater than an F in a course can be levied only through the University Judicial System. With regards to finding the student either responsible or not responsible for his or her action, the ruling of the Judicial Hearing Board shall be binding. In cases where there is either a finding of responsibility or an admission of responsibility by the student, any recommendations by the hearing board regarding the course grade are non-binding on the instructor, who remains solely responsible for assigning a course grade, consistent with the policies set forth in the course syllabus.*